

ART. VII.—NEW ENGLAND SPIDERS OF THE FAMILY EPEIRIDÆ.

BY J. H. EMERTON.

ON account of their bright colors and conspicuous webs, the Epeiridæ are better known than the other families of spiders and many of our species have been already described. The general works of Koch, 1831 to 1848, and Walckenaer, 1837 to 1847, contain descriptions of many American spiders, which cannot however be identified with much certainty. The descriptions of Araneides of the United States by N. M. Hentz, published in the Journal of the Boston Society of Natural History from 1842 to 1850, are largely of southern spiders. I have however identified twenty New England species with Hentz's descriptions. Since Hentz a few northern spiders of this family have been described in the following papers.

- Giebel: Illinois Spiders. *Zeitschrift für Gesammten Naturwissenschaften*, 1869.
J. Blackwall: Spiders from Canada. *Ann. and Mag. of Nat. Hist.*, vol. xvii, p. 77.
O. P. Cambridge: Newfoundland Spiders. *Proc. Royal Phys. Soc. Edinb.*, 1881.
T. Thorell: Labrador Spiders collected by Packard. *Proc. Boston Soc. of Nat. Hist.*, vol. xvii, 1875.
T. Thorell: Bulletin of Hayden's U. S. Survey of the Territories. Spiders collected by Packard in Colorado, 1877.
E. Keyserling: Beschreibungen neuer und wenig bekannter Arten Orbiteke. *Sitzungsberichte der Isis*, Dresden, 1863.
 Beiträge zur Kenntniss der Orbiteke Latr. *Verhandlungen der Zool. Botan. Gesellschaft in Wien*, 1865.
 Neue Spinnen aus Amerika. *Zool. Bot. Gesellschaft in Wien*, 1879, 1880, 1881, 1882.
H. C. McCook: *Epeira radiosa*. *Proc. Phil. Acad. Nat. Sci.*, 1881, p. 163.
 Webs of *E. triaranea* and other new species. *Proc. Phil. Acad.*, 1876.
 Webs of Epeiridæ. *Proc. Phil. Acad.*, 1881, p. 431 and 173; 1878, p. 124.

Besides these species described from American spiders, several of our common Epeiridæ are also found in Europe and have there long been known and described. In identifying these I have been much helped by European specimens determined for me by Messrs. Thorell, Cambridge, Simon and Koch. In naming European species I have followed as closely as possible Thorell's Synonyms of European Spiders, and have given the synonyms used by Simon, Blackwall and Menge.

The spiders which I have examined are chiefly from the same localities as the Therididae described in *Trans. Conn. Acad.*, vol. vi, pp. 1 to 80, but owing to the greater ease of finding Epeiridae, the common species have been taken at many more places and I have had much more help from other collectors. Besides my own collection I have examined those of Bowdoin College, Cornell University, Yale College, H. C. McCook of Philadelphia and Geo. Marx of Washington. I have also received specimens from J. B. Tyrrell, Toronto, Canada. From the Adirondacks and Rocky Mountains from F. A. Bowditch of Boston. From the neighborhood of Boston from S. Henshaw, and from many other places and persons.

The Epeiridae are distinguished from other spiders by their round webs formed of radiating threads crossed by others which are covered when fresh with a sticky fluid that collects on them in drops. These webs and the way in which they are made have been often described. The radiating lines are first spun and tightened by many irregular short cross lines at the center. Then a spiral line is begun passing around the center, at first with the whorls very close together, then suddenly widening it is continued to the outside of the web with the whorls as far apart as the spider can reach. The sticky spirals are then begun at the outside close together and as they cross the line of the first spiral, the latter is bitten away, leaving in the finished web only little thickened spots on the rays to show its course. Pl. XI, fig. 1. Toward the center of the web the sticky spirals are usually a little closer until about the length of the spider's longest legs from the center, where they stop, leaving a ring without cross lines around the closer part of the first spiral. When the web is finished the spider is thus left in the center where it can hold itself without interfering with the sticky threads until something is caught.

The Epeiridae usually have the abdomen large, short and thick, so that they walk awkwardly on a flat surface, their natural position being back downward holding to the web by their feet.

The cephalothorax is usually wide and the head low with the eyes around the front, not over the back as in some families. The lateral eyes are usually very close together, and separated far from the middle pairs.

The mouth parts are short and stout, except in Tetragnatha, the maxillae and labium rounded at the tips. Pl. XI, fig. 6.

The markings of the abdomen usually form, as in some Therididae, a wide scolloped stripe which has been called the "folium," usually bordered by a dark and light stripe and enclosing one or more pairs

of spots on each segment; those of the two front segments being usually larger and brighter than the others. These markings can be seen on the figures on Plates xxxiii and xxxiv.

Like Therididæ the Epeiridæ have three claws on the feet and, under the claws, stiff toothed hairs. The middle claw is shorter than the others and has two or three short teeth. The lateral claws have more and larger teeth varying in different individuals, on different feet and according to the species. The inner claw also differs from the outer as shown on Pl. xl, figs. 3, 4, 5. The toothed spines have also a definite number and arrangement.

The spinnerets are short and closed together when not in use so that the middle pair are concealed. Between the front pair of spinnerets is a short process covered with hairs but without spinning tubes.

The males are smaller than the females and have a smaller abdomen and longer legs some of which are often thickened or otherwise modified in shape. The difference between the sexes is greatest in the genus *Argiope*, in which the females become very large about the time for laying eggs.

The copulating organs are described in the following descriptions of the two sub-families.

The genera *Uloborus* and *Hyptiotes*, which have been placed in this family by Thorell and others on account of the resemblance of their webs to those of Epeiridæ, seem to me to belong more properly with the Cniflonidæ with which they agree in having the calamistrum and cribellum and in the structure of the adhesive thread by which their webs are crossed. This classification is followed by Simon in *Arachnides de France* and by Bertkau in *Archiv fur Naturgeschichte*, 1882. Leaving out these I divide the family into the two following sub-families.

Epeirinae.

This group includes all the family except *Tetragnatha* and *Pachygnatha*. They are generally short and stout spiders with the abdomen round and plainly marked. The head is low and wide. The maxillæ and labium are short and rounded. The mandibles are short and stout. The male palpi are large without a movable hook on the tarsi. The palpal organs are generally rounded and have a short tube but long terminal hook and other appendages. The epigynum varies greatly in different genera but always has external hard parts.

The following genera belong in this sub-family. *Epeira*, *Singa*, *Zilla*, *Micropeira*, *Cyclosa*, *Aerosoma*, *Cyrtarachne*, *Argiope*, *Argyropeira*,

Tetragnathinæ.

These differ considerably from the other Epeiridæ. The maxillæ and labium are shaped at the end as in the Epeirinae but are much longer. The mandibles, especially in the males, are very long and toothed on the inner edge. The eyes are on the front of the head in two rows, the lateral pairs not so distinctly separated from the others as in Epeirinae. The epigynum is internal, consisting only of a pouch with simple spermathecae. Pl. XL, fig. 7. The palpal organs are not enclosed by the tarsus and the tarsus has a long movable hook jointed to its base. Pl. XL, figs. 5 and 6. The colors are light, usually yellowish with gray markings and silvery spots and bands. Genera *Tetragnatha*, *Pachygnatha*.

Epeira.

In *Epeira* the front of the head is low and the lateral eyes are much farther from the middle ones than these are from each other. The abdomen is usually round, or short oval, sometimes widened and thickened a little at the front end with two humps or horns on the back. The epigynum is covered by a hook or finger which is sometimes narrow and soft and placed between two elevations, and sometimes wide enough to cover all the other parts as in *E. domiciliorum* and *trivittata*. The males are always somewhat smaller than the females and have longer legs, the second pair of which are often thickened or curved. The palpal organs are large and have a short tube with a large terminal hook and large hard processes at the base. The tarsus has a short curved spur at the base. The tibia and patella of the male palpi are usually short.

Epeira nordmanni, *cinerea*, *silvatica*, *angulata*, *solitaria* and *corticaria*.

All these spiders have two slight humps on the front of the abdomen, which is a little wider and thicker in front than in other species. The colors are generally dark. Most of the spiders grow to a large size and are generally found in woods of large trees. *Silvatica*, *angulata* and *solitaria* resemble each other closely and may be mistaken one for the other. In *angulata* the sternum has a yellow middle stripe and the abdomen yellow spots between the spinnerets and epigynum. In *silvatica* the sternum is brown and the abdomen brown beneath with only indistinct markings. The male *angulata* has a large spine on the coxæ of the second legs, while in *silvatica* this spine is very small. The enlarged tibia of the second legs in the male *angulata* is nearly as long as tibia of the first legs. In *silvatica* the second tibia is more slender and much shorter than the tibia of the first pair. The folium of *silvatica* has a row of oblique black markings along the edge on each side, while in *angulata* it is evenly notched. The male *solitaria* is much larger than the other species. It has the spines on the second coxæ very large and smaller ones on the first coxæ. The under side of the abdomen and sternum are black and the folium indistinct. *E. corticaria* may be mis-

Epeira angulata (Clerck, 1757) Thor., Blk., Menge.

PLATE XXXIII, FIGURES 12, 12a. PLATE XXXV, FIGURE 2.

The adult female is 16^{mm} long. The colors are brighter than in *silvatica*. The dark brown rings on the legs are darker and more distinct. The sternum has a bright yellow line in the middle. The under side of the abdomen is black. Between the epigynum and spinnerets are several irregular yellow spots as in some specimens of the European *angulata*. The abdomen is nearly as wide as long with two large humps on the first segment. The front of the abdomen, including the front half of the humps, is dark brown except a bright yellow mark in the middle and a few small light spots. The rest of the back of the abdomen is lighter. The folium is dark brown at the sides and deeply scalloped. The edge is marked by a dark and light line which is not broken into short black lines as in *silvatica*. Pl. xxxiii, fig. 12, 12a.

The males are colored in the same way. The tibia of the second legs is thickened and the metatarsus curved. The coxa of the second pair has a conical spine near the base.

The epigynum is small but the finger is thicker than in *silvatica*. The palpal organs are large with the terminal hook short and sharp, shorter than in *silvatica*. Pl. xxxv, fig. 2.

Two males were found in woods on Mt. Tom, Holyoke, Mass., near a large web across a path. The females could not be found. A female was found in a large web eight feet from the ground between two trees six feet apart in Beverly, Mass.

Adult ♀ from Illinois, Knox Co., Cornell Univ. Collection.

Epeira solitaria, new.

PLATE XXXIII, FIGURE 11. PLATE XXXV, FIGURE 3.

This large spider, of which I have only seen one male, is 14^{mm} long with the front legs 28^{mm}. The general appearance is like that of the male *angulata*. The conical spines on the second coxæ are very large and there are smaller ones on the first coxæ. The palpal organ has a very long black terminal hook. Pl. xxxv, fig. 3. The sternum, the coxæ and the under side of the abdomen are black. The cephalo-

taken for the young of other species on account of its small size. The colors are however lighter and the rings on the legs narrower and more numerous. The epigynum is nearly as large as that of *silvatica* and differently shaped. Pl. xxxv, fig. 9. The finger is liable to be broken off.

thorax is dark brown. The usual yellow spot on the first segment of the abdomen is large and bright. There are two humps as in *angulata*. The folium is black with a few yellow spots and the side areas are covered with irregular spots of black and yellow. The legs and palpi are marked as in the male *angulata* but the femora are darker. The tibia of the second pair is enlarged as in the allied species.

This spider was found on the fence of the reservoir below Spring pond in Peabody, Mass., Sept. 20, 1869.

Epeira corticaria, new.

PLATE XXXIII, FIGURE 14. PLATE XXXV, FIGURE 9.

This little spider may easily be mistaken for the young of *angulata*. It is 6^{mm} long, light reddish brown in color with lighter dull yellow markings. The cephalothorax has a wide middle dark stripe divided in front behind the eyes. It is also dark on the edges. The legs are dull yellow, with wide brown rings at the end and middle of each joint. The abdomen is widest at the first segment and has there two horns. The front of the abdomen is dark reddish brown with light spots in the middle and a light line along the hinder edge from one horn to the other. Behind this dark area the abdomen is lighter and covered with fine spots. The folium is distinct but not very dark and has oblique dark brown lines along the edges like *silvatica*. The sternum is dark brown. The epigynum is large and has a thick finger widened near the base. In three out of four of my specimens the finger is broken off.

Beverly, Mass., and Adirondack Mts., N. Y.

Epeira silvatica, new.

PLATE XXXIII, FIGURES 13, 13a. PLATE XXXV, FIGURES 1, 4, 5, 6.

Length of female from Beverly, 16^{mm}; first leg, 23^{mm}.

The abdomen is nearly as wide as long and has on the first segment two prominent humps. The cephalothorax is dark brown with indistinct darker lines in the middle and on each side. The legs are brown with dark rings at the ends of the joints and less distinct ones in the middle. The abdomen has a bright yellow spot on the front, behind which is a median row of smaller light spots. The greater part of the abdomen is of a light brown color. The front around the yellow spot is darker and so is the folium which is marked on the edges by five pairs of oblique black lines surrounded by a lighter border. The under side of the abdomen is dark brown without markings in the adult female but young females and males have two

distinct yellow spots in the middle and two smaller ones near the breathing holes. The epigynum is small for so large a spider. The finger is long and slender as in *angulata*. Young specimens apparently of the same species are more distinctly marked. They have the dark markings on the middle and sides of the head much plainer than the adults and the yellow spots under the abdomen.

The male is about half as large as the female. (The largest, one from Beverly, is 10^{mm} long, 1st leg 21^{mm}) with the front legs proportionately much longer. The tibiae of the second pair are thickened and have the spines larger and more numerous than in the female. The coxa of the second pair has a short conical point near its base and the coxa of the first pair a hook on the under side near the outer edge. These modifications of the front coxae are found in several species. The colors are similar to those of the female. The dark rings near the ends of the joints of the legs do not extend quite to the end, the joint having a lighter tip. The folium is more regular than in the female and the humps are absent. The sternum is black. The under side of the abdomen has four yellow spots more or less united at the sides.

Beverly, Mass., E. Burgess; Mt. Jefferson, N. H.; Chateaugay Lake, Adirondack Mts., N. Y., from F. A. Bowditch; Ithaca, N. Y., Cornell Univ. Collection.

Epeira nordmanni Thorell. Synonyms of European Spiders.

PLATE XXXIII, FIGURES 6, 6a, 6b.

Female, 11^{mm} long; first leg, 18^{mm}.

The colors are white and gray or black. The cephalothorax is gray, in alcohol yellow, darkest toward the sides. The legs have a dark ring at the end and a less distinct one in the middle of each joint. The sternum is light brown or black. The abdomen is narrower than that of *angulata*, but has two humps on the first segment like that species. The folium is narrow and truncated in front in line with the second pair of muscular spots. The edges of the folium are marked with five pairs of very black lines converging backward. The light stripes at the sides of the folium are wide and the lateral dark markings sharply defined. In front there is a central white mark, on each side of which are dark areas that extend back so far as to cover half of the humps and enclose a large spot between them. In some specimens the folium and other dark markings are nearly uniform black with sharply marked edges and with some white spots in the center. In one female from Western New York apparently

of this species the dorsal markings are very obscure, and the light areas of a reddish color like old specimens of *Epeira trivittata*. The ventral markings are as distinct as usual. The under side of the abdomen has a middle dark area from the sternum to the spinnerets. In this area are four yellow spots, two just behind the respiratory openings and two farther back. In some these spots are connected by the light stripe along the sides of the dark area. The finger of the epigynum is widened at the base somewhat as in *corticaria*.

I have adult females from Quohaug Bay, 20 miles east of Portland, Me., where they were abundant on low bushes in September, and young from Eastport, Me., and the White Mts. Huntington, Mass., young; Philadelphia, H. C. McCook; Western New York, E. P. Van Duzee. I have compared specimens from Norway from Thorell's collection.

Epeira cinerea, new.

PLATE XXXIII, FIGURE 10. PLATE XXXV, FIGURES 7, 8.

Female 18^{mm} long; cephalothorax, 6.5^{mm}; first leg, 26^{mm}.

The color is dirty white with grayish markings. Long white hairs are scattered all over the body. The cephalothorax is a little darker at the sides. The legs have gray rings at the end and middle of each joint which are hardly visible in very light individuals and nearly black in dark ones. The abdomen has two slight humps on the first segment. The folium and other markings are like those of *angulata* and allied species but very pale and indistinct. The sternum is dark brown. The under side of the abdomen has a central dark stripe bordered by light yellow curved markings. The epigynum is small and has a wide finger turned up at the end, behind which is a slight hollow.

The male has the same colors and markings as the female. The tibiæ of the second pair of legs are not thickened.

This spider is common about barns and fences in Maine. Mr. Howard of New Haven, found it very abundant at Upton, Maine, near Umbagog lake. I have it also from Bethel, Me., Gorham, N. H., and Au Sable chasm, northern New York. I have never seen it in other parts of New England nor farther south, except from Carter County, Kentucky, where it was collected by F. G. Sanborn for the Kentucky Geological Survey.

Epeira scolopetaria, *E. patigiata* and *E. stric*.

These three house spiders resemble each other closely in size, color and habits, and are easily mistaken one for the other. *Ep. scolopetaria* is the most common house

Epeira scolopetaria (Clerck) Thorell, Menge.*E. sericatu* Blk.

PLATE XXXIII, FIGURE 4. PLATE XXXV, FIGURE 10.

Large female, from Salem, 15^{mm} long; 1st leg, 24^{mm}. Average female, Essex Bridge, Salem, 11^{mm} long; 1st leg, 18^{mm}.

The whole body is covered with light gray hairs which obscure the color and markings of the skin. When wet in alcohol the dark markings appear dark brown, and the lighter parts dull yellow. The cephalothorax is dark brown or gray without markings. The legs are marked with light and dark rings. The femur has the inner half light and the outer half dark. The patella is darkest toward the tip. The tibia and the metatarsus are dark at both ends and have a dark ring near the middle. The sternum is dark brown with a roundish light spot in the middle and the coxæ light. The top of the abdomen is dull yellow with dark brown or black markings. The folium has a distinct dark and light line around the scalloped edges, broken on each side between the first and second segments. These breaks are usually distinct and distinguish this spider from *patagiata*, *strix* and other related species in which the edge of the folium is usually entire. The median dark spot at the front of the abdomen is large and plain in this species and is followed by a line

Epeira in Europe and America. It lives in barns and windows of houses and on fences, and between the timbers of wharves and bridges, but is rarely found on plants or away from houses. *Ep. patagiata* is occasionally found about houses in the same way in both countries and also on plants. It appears to be a northern species and is not found, as far as I know, south of New England nor in southern Connecticut. *Ep. strix* is an American species usually found on plants but sometimes about houses like *scolopetaria*. The colors and markings of these three species are usually distinctive, but occasional individuals of *scolopetaria* and *patagiata* resemble each other very closely. In *scolopetaria* the colors are gray inclining to yellow. The edges of the folium are broken on the first segment, which is not the case in the other species. The colors of *E. patagiata* incline to red, especially in alcohol. The abdomen is usually flatter than in *scolopetaria* and the folium wide and unbroken at the edges. In *strix* the colors are more as in *scolopetaria*, the abdomen very oval, the folium narrow and the sides of the abdomen much lighter colored. The legs of *scolopetaria* are the longest and those of *strix* shortest. The males can be easily distinguished by their palpi. In *scolopetaria* the fork at the base of the palpal organ is slender and the terminal hook long and blunt. In *strix* the fork is also slender, the outer tooth longer than in *scolopetaria* and the terminal hook is stouter but with a sharp point. The fork in *patagiata* is short and twice as thick as in the other species, both teeth turned up at the ends, and the terminal hook is long like *scolopetaria* but pointed at the tip. The finger of the epigynum of *patagiata* is flat and widened at the tip, while in *scolopetaria* and *strix* it is round as usual.

of smaller median triangular spots. The dark portions of the folium on the first segment are distinctly separated from the rest by the gaps in the edges of the folium and a light area extending back to the second pair of muscular spots. The dark areas at the sides of the folium on the hinder segments are broken by lighter transverse stripes on each segment. Beneath the abdomen are the usual semi-circular bright yellow markings, partly enclosing a dark spot which extends back to the spinnerets. Very dark individuals have the dark markings of the abdomen black and the lighter marks bright white, and very light individuals have all the markings light yellowish brown and indistinct. This is the most common *Epeira* about barns and fences and especially on wharves and bridges, but is seldom found on plants and never far from houses. It seems to be common all over the country, and equally so in Europe. It makes its web usually toward evening and remains in it during the night, but in the daytime hides in some crack near by where it makes a slight shelter of silk. It sometimes holds a thread leading to the center of the web. Adults are found at all seasons but most abundantly in the summer. I have seen the cocoons in June.

The male differs from the female chiefly in greater length of the front legs and smaller size of the abdomen. The palpi are short. The tarsus has a slight notch at the base behind which a blunt process turns up toward the end of the palpus. The palpal organ is twisted together and partly enclosed in the tarsus. The tube is very short and simple, near the middle of the palpal organ under the ends of the other appendages. The largest of these is a hard forked process near the base of the bulb. Beyond this and near the tube is a thin, flat appendage, and at the end of the organ beyond the tube is a large hook with a shorter roughened process at its base.

The epigynum has two hard prominences between which is a flexible, finger-like appendage. In *sclopetaria* and *strix* this finger is narrow and usually turned up at the end. In *patagiata* the finger is wide and flat, and dark colored at the end.

Under the name of *Epeira vulgaris*, Hentz probably included this and other allied species. The picture from which his figure of *E. vulgaris* is engraved may be from this species, but quite as likely from some southern spider not described here.

Epeira patagiata (Clerck) Thor., Blk., Menge.*Ep. formosa* Keys., Zool. Botan. Gesellsch., Wien. 1865.*Ep. hilaris* Camb., from Newfoundland, Proc. Roy. Phys. Soc., Edinburgh, 1881.

PLATE XXXIII, FIGURES 3, 3a, 3b, 3c. PLATE XXXV, FIGURE 11.

Female, from Salem, 9^{mm} long; 1st leg, 15^{mm}. Female, from Mt. Washington, 11^{mm}; 1st leg, 14^{mm}. Female, from Beverly, 10^{mm} long; 1st leg, 15^{mm}.

This spider is slightly smaller than *sclopetaria* and like that species varies greatly in size and the length of the legs. The abdomen is nearly round, as in *sclopetaria*, but slightly flatter on the back. The colors are lighter than those of *sclopetaria* and the light markings have a reddish color, especially in alcohol, in place of the dull yellow of *sclopetaria*. The cephalothorax is light brownish yellow with light hairs. The legs are ringed with dark and light, as in *sclopetaria*, but the dark parts are brighter reddish brown. The abdomen is marked with various shades of brown. The folium has the edges plainly marked and not broken on the second segment as in *sclopetaria*. The color of the folium is usually broken by lighter transverse bands and spots. The light bands on the second segment are often very large and united with the light markings on the first segment while behind they are separated by a sharp line from the darker part of the folium. Some dark specimens have the folium of a uniform dark brown color, broken only by irregular small light spots. Figs. 3, 3a, 3b, 3c.

This species is abundant in the White Mountains and the Adirondacks where it lives on plants away from houses. In Montreal, Canada; Albany, New York; Eastport and Portland, Me.; Ithaca, N. Y., Cornell University Collection; and in eastern Massachusetts it is a common house and fence spider, and is also found on bushes. I have not found it in several seasons' collecting at New Haven, Conn., nor on Cape Cod and Martha's Vineyard, nor is it among a large lot of house *Epeira* from Noank, Conn. Mr. McCook, in Philadelphia, and Mr. Marx, of Washington, have not found it in their southern collecting, so that it is probably not common south of Massachusetts and New York. It is a common European species.

Epeira strix Hentz.*Ep. apoclisu* Giebel, Illinois spiders, Zeitschrift für Gesamten Naturwiss., 1869.Probably *E. affinis* Blk., from Canada. Ann. and Mag. of Nat. Hist., vol. xvii.

PLATE XXXIII, FIGURE 5. PLATE XXXV, FIGURE 12.

10^{mm} long; 1st leg, 14^{mm}.

This species usually differs considerably in its general appearance

from *patagiata* and *sclopetaria*. It resembles the lighter individuals of *sclopetaria* in color, but differs in form. The abdomen is longer and the legs shorter and stouter and the whole body is less hairy. The cephalothorax is reddish brown with a dark stripe each side and a less distinct one in the middle. The legs are light brownish yellow with a dark ring at the end of each joint. The sides of the abdomen are light. The folium is not much wider in front than behind, and seldom has larger spots or other irregular markings at the front end. The folium is dark brown with a light stripe along the middle, in which is a darker line indistinct except at the forward end.

This species is found from Massachusetts to Maryland. It lives occasionally with *sclopetaria* about houses, bridges and fences but more commonly on low bushes. In the daytime it seldom lives in its web nor does it hide in a nest near it, but oftener goes down to the ground or to a distant part of the plant. It is often found under stones. It becomes adult late in the summer. Young are found under leaves during the winter. I once saw the process of laying the eggs and making the cocoon by this species. The spider first made a bunch of loose silk under which it held itself and forced the eggs upward into the middle of it. The eggs were soft and adhered together and to the silk enough to stay in place while the spider spun silk over them till they were entirely concealed.

The male differs but little from the female, less than in the two related species.

Epeira trifolium Hentz.

PLATE XXXIII, FIGURES 8, *8a*, *8b*. PLATE XXXV, FIGURES 13, 14, 21, 22.

Large female from Salem, Mass., 18^{mm} long; first leg, 27^{mm}. Average female from Salem, Mass., 13^{mm} long; first leg 18^{mm}.

The colors of the female are very variable, some having the abdomen dark reddish brown, sometimes with a purplish tinge and others various shades of gray to almost white without any markings on the abdomen. White specimens kept in confinement have changed in a few days to the usual reddish brown. The usual markings on the abdomen are four white spots near the four muscular pits, a median row of white spots and several irregular transverse rows, all trace of the edges of the folium being absent except in young individuals. The under side of the abdomen is dark brown even in light colored individuals, and the semicircular bright yellow marks are absent except in the young where they sometimes show. The cephalothorax

is white with three wide dark brown lines. The legs are white with a dark brown ring at the end of each joint and in the middle of the fourth femur. The sternum is dark brown with sometimes a light stripe in the middle.

The male is not more than 6 or 7^{mm} long, and light colored. The markings are similar to those of the female but all fainter or indistinct. The legs are long, and the spines long and black. The tibiae of the second legs are not modified as in some species. The palpal organ of the male is small with a short, stout terminal hook and a small basal process with a long black curved tooth.

The males are found in August and September and the females get their full size and lay eggs in October.

They live on bushes, oftenest on small alders around the borders of open, wet ground. They seldom stand in the web in the daytime but occupy a tent made of two or three living leaves drawn together and lined with silk. The spider holds a thread leading to the center of the web.

Hentz's *E. obesa* and *E. aureola* are probably light individuals of this species, and *E. septima* may be an old female of large size with the colors faded and abdomen shrunken after laying her eggs. I have seen a few in this condition, in which the light markings were all browner and the dark markings paler than in younger spiders.

The resemblance between the females of this species and the European *E. quadrata* is very close. Usually the abdomen of *trifolium* is rounder, the white markings smaller, and the edges of the folium less distinct than in *quadrata*. The finger of the epigynum of *trifolium* is not widened at the base but is of about the same size from base to tip. The finger of the epigynum of *quadrata* is wide at the base and tapers toward the tip. Plate xxxv, figs. 19, 20, 21, 22.

The male of *trifolium* is much smaller than that of *quadrata*. The tibia of the second legs is not thickened. The palpi are not more than half as large and the process at the base of the palpal organ is small as in most species, while in *quadrata* it is very large, nearly as long as the rest of the palpal organ. Plate 3, fig. 15.

Canada, New England, New York and southward.

Epeira marmorea (Clerck) Thor.

PLATE XXXIII, FIGURE 2. PLATE XXXV, FIGURE 17.

Female 10 or 12^{mm} long; first leg 15^{mm}. The cephalothorax is dull yellow with indistinct darker lines in the middle and at the sides. The femur of each leg is yellow or oftener bright orange with a

darker ring at the end and sometimes around the middle. The patella is the same color darker toward the tip. The other joints are white with orange or dark brown rings at the end. The sternum is dark brown, rarely with an indistinct light mark in the middle. The abdomen is marked on the back with a folium extending its whole length or with the front portion indistinct or absent in very light specimens. The light parts are white, yellow or occasionally orange, the dark parts gray or light brown. The two light spots near the muscular marks on the first segment and the median stripe form a cross-shaped marking in the front of the abdomen. The spots on the other segments decrease in size backward. The edges of the folium are dark with a narrow light line outside. The sides of the abdomen are marked with oblique dark stripes not sharply separated from the lighter spaces between. The under side of the abdomen has the usual dark area in the middle with a semicircular yellow marking each side of it. I have never found any marked like *E. pyramidata* of Europe, which is supposed to be a variety of *marmorea*.

A male from Beverly, Mass., measures 8^{mm} long; first leg 16^{mm}. A larger male from Mt. Tom, Mass., is 10^{mm} long; first leg 18^{mm}. The only European specimen that I have is 8^{mm} long. The colors and markings are like those of the female. The tibiae of the second legs are much enlarged and the spines on the inner side are short and stout. The coxae of the second pair have a long conical spine near the base. The palpal organ is large and dark colored. At the base of the bulb there is the usual process with a blunt tooth at the outer corner, and a short sharp one just under the end of the tube and terminal hook. The terminal hook is not so darkly colored as the other appendages. It is long enough to cover the whole width of the organ. The tube is short and can be distinguished by its dark color under the end of the terminal hook. The tube has a large flat process near the tip which cannot be easily seen without pressing the appendages apart.

In Beverly, Mass., this species is as common as *insularis* and lives in the same places on bushes near meadows. From the woods on Mt. Tom, Holyoke, Mass., I have two adult males and several immature females taken in July, 1873, all very large specimens and very pale, showing hardly any trace of the folium or the rings on the legs. I have it also from Eastport, Me., and western Massachusetts. A male and female from Chateaugay lake, Adirondack Mts., from F. A. Bowditch; Canada, J. B. Tyrrell.

Epeira insularis Hentz.

E. annulipes Geibel, Illinois spiders, Zeitschrift für Gesamten Naturwissenschaften, 1869.

PLATE XXXIII, FIGURE 1. PLATE XXXV, FIGURE 18.

The females are usually larger and the males smaller than in *marmorea*. The largest female I have seen, a bright orange one from New Haven, Conn., measured 19^{mm} long; first leg 24^{mm}. One of the usual size measured 13^{mm} long; first leg 17^{mm}. The cephalothorax is dull yellow with slightly darker lines in the middle and at the sides as in *marmorea*. The femur and patella of all the legs are bright orange, darker toward the ends with sometimes a darker ring in the middle of the femur. The other joints are white with brown ends as in *marmorea*. The sternum is light brown on the edges and bright yellow in the middle. The light markings of the abdomen are bright yellow or occasionally deep orange. The dark markings are dark brown or purplish. The markings are all sharply defined. The folium is deeply scolloped and bordered by a wide yellow line, outside of which is a row of irregular yellow spots. The spots inside the folium are in the same positions as in *marmorea* but are much larger. The wider side of the abdomen is marked as in *marmorea*.

The males are 7^{mm} long, first leg 13^{mm} and marked like the females. The dark stripes on the cephalothorax and the rings on the legs are plainer than on the female. The coxæ of the second legs have only a slight hump in place of the spine. The tibiæ of the second pair are enlarged and spiny as in *marmorea*.

This species is more common in Massachusetts and Connecticut than *marmorea*. It lives with *trifolium* on high bushes three or four feet from the ground, usually near water. It makes a tent under which it is usually found holding a thread leading from the center of the web. The males are found near the tents of the females in August and September. This species was found by Hentz in Alabama.

Epeira thaddeus Hentz.

PLATE XXXIII, FIGURE 9.

This species may readily be mistaken for young *insularis*. It is 7^{mm} long, with a wide, round, white or yellow abdomen, with two dark stripes extending from near the middle of the front around the sides under the abdomen nearly to the spinnerets. Under the abdomen there is a light spot just back of the epigynum surrounded by a large dark area which extends back nearly to the spinnerets. The epigy-

num is very small and light colored. On some specimens there are indistinct spots and other traces of the folium toward the end of the abdomen. The cephalothorax is yellow with sometimes dark spots at the sides. The two front pairs of legs have the femur, patella and tibia orange, darker at the ends. The tarsi are white with brown tips. The other legs have the femur and patella orange and the other joints white with dark rings at the ends. The tibia of the fourth pair has a wide dark ring at the tip.

These spiders live in tents near the web, like *marmorea* and *insularis*, and are often found on fences. Around New Haven, Conn., they are common, and I have them from several places in Eastern Massachusetts. Hentz's original painting had the colors much brighter than any specimen I have seen.

Epeira pratensis Hentz.

PLATE XXXIII, FIGURES 15, 15a. PLATE XXXVI, FIGURE 9.

Adult females from Chelsea marshes, Mass., are 8^{mm} long. The cephalothorax and abdomen are both rather longer and narrower than in *trivittata*. The colors are yellow and yellowish brown with, in some specimens, bright red marks on the edges of the middle stripe. The cephalothorax is dull yellow with a middle and two lateral stripes slightly darker but these are often absent in light specimens. The legs are dull yellow, slightly darker at the ends of the joints. The abdomen has a middle dark stripe, at the sides of which are two narrow bright yellow lines which are sometimes bordered with red near the front of the abdomen. Outside of the middle stripes are six pairs of black spots partly surrounded by yellow which are the only traces of the edges of the folium. The

Epeira pratensis, *trivittata* and *domiciliorum*.

These three species resemble each other closely and some individuals of either species may be mistaken for one of the others. They resemble each other most in autumn when the colors of all three are darker and the markings more obscure. The palpal organs are so much alike that they give no help in distinguishing the species. Females of *domiciliorum* are larger than the other species and early in the summer can usually be distinguished by their markings. The males of this species differ from those of *trivittata* in having the tibiae of the second legs a little less curved and in darker colors. The markings of females of *trivittata* and *pratensis* are often much alike, but *pratensis* has generally a longer abdomen and less distinct folium than *trivittata*. The males of *pratensis* have the cephalothorax longer and the head more prominent than in the other species. *Trivittata* is the most common of the three species and the most variable. *Domiciliorum* is most common on fences and in gardens.

colors grow darker with age, and in September and October old females are sometimes found of a dark reddish brown color with hardly a trace of the summer markings. The sternum is brown with a yellow stripe in the middle. The under side of the abdomen has a dark area with two yellow curved marks which may be broken into four spots. There are also two yellow spots each side of the spinnerets. The external part of the epigynum is a large hook flattened at the end. The single opening is directed backward under the hook. The male has the spots on the abdomen plainer than the female. The femur of the second leg is thicker than the others and the tibia is somewhat thickened and curved and has short and stout spines on the inner side. The palpal organ is small and simple. Plate xxxvi, figure 9.

This is found in many places in Eastern Massachusetts, but not as commonly as *domiciliorum*. It is very abundant on grass on the Chelsea salt marshes in company with *trivittata*, where it becomes adult in the latter part of July.

Epeira trivittata Keyserling. Sitzungsberichte der Isis, Dresden, 1863.

PLATE XXXIII, FIGURES 16, 16a. PLATE XXXVI, FIGURES 2, 3, 5, 8.

This is one of the most common spiders in New England. It lives usually in grass and low bushes, but seldom on trees or fences. It varies much in size, the large females measuring about 7^{mm} long, and the first leg 12^{mm}. Adults however occur not more than half as large. The color is light yellow with brownish rings on the legs at the end of each joint and three indistinct dark stripes on the cephalothorax. The back of the abdomen has a row of light spots in the middle sometimes nearly united into a stripe. Four light spots on the front of the abdomen are more or less connected with the middle row. The edge of the folium is marked by rows of dark brown spots partly surrounded with yellow, and between these and the middle spots the folium is dark brown. The sternum is bright yellow in the middle and the under side of the abdomen is marked as in *domiciliorum* with a dark center and four or six yellow spots. The epigynum is covered by a strong hook, with the opening under it directed backward.

The males resemble the females in color and markings. On the under side of each femur is a single row of long spines. The tibia of the second pair is strongly curved, Plate xxxvi, fig. 2, and has strong spines on the inner side, those near the base being much longer than the others. The palpal organs of *trivittata*, *pratensis* and *domicili-*

orum are much alike. The tube and all the appendages are small and crowded together near the end of the organ. The plainest difference between this and the male *domiciliorum* is in the shape of the tibia of the second pair of legs. Plate xxxvi, figs. 1, 2.

This species seems to mature earlier in the summer than *domiciliorum*, adults of both sexes being abundant from June to August. In open places and especially toward the latter part of the summer the colors become darker and it resembles the next species.

White Mountains; Massachusetts; Connecticut and southward.

Epeira domiciliorum Hentz.

Probably *E. Hentzi* Keys., Sitzungsberichte der Isis, Dresden, 1863.

PLATE XXXIII, FIGURE 17. PLATE XXXVI, FIGURES 1, 4.

This species is larger than *trivittata* and measures 10 to 12^{mm} in length, and the first legs 15 to 20^{mm}. The cephalothorax has three dark stripes more distinct than in *trivittata*. The femora are orange red and the other joints light yellow with wide dark brown rings at the ends and middle of each joint. The abdomen has a straight light stripe along the middle of the back from which a pair of less distinct branches extend at right angles on each segment as far as the edges of the folium. In the end of each of these light branches is a black spot and between them dark brown areas which become lighter toward the sides where they divide into fainter branches. In the autumn the colors become darker and in some individuals the light markings are hardly visible and occasionally the back is almost white with the brown marks on the sides very faint. The sternum is black with a bright yellow middle stripe. The under side of the abdomen is black in the middle, with four bright yellow spots and two fainter ones near the spinnerets. The epigynum is covered by a large hook with the opening on its under side, as in *trivittata*.

The male is marked like the female with the dark markings usually more distinct. The palpi are like those of *trivittata*. The plainest difference between this and *trivittata* is in the shape of the tibia of the second pair of legs. In *trivittata* this joint is strongly curved outward, while in *domiciliorum* it is nearly straight. In *domiciliorum* the thick spines on the inner side are nearly all of the same size, while in *trivittata* the spines near the basal end are much longer than the others. Pl. xxxvi, figs. 1 and 2.

This spider inhabits fences and plants in gardens much more commonly than *trivittata* and is also found in open woods on low trees, but seldom in grass. Massachusetts and Connecticut and southward.

Epeira displicata Hentz.

PLATE XXXIV, FIGURE 4. PLATE XXXVI, FIGURE 20.

Full grown females are sometimes 7 or 8^{mm} long, but usually smaller. The cephalothorax and legs are brownish yellow. The abdomen is light yellow or crimson. The latter color is more common in young individuals and becomes brighter in alcohol. Sometimes there are two white lines in the middle. At the sides of the hinder half of the abdomen are three pairs of round black spots surrounded by lighter rings. The under side of the abdomen is colored like the upper with no distinct markings. The sternum is yellow like the legs. The legs have no dark rings but are darker toward the ends and in some individuals, especially males, on the ends of the joints. The epigynum is small and dark colored with a small and slender finger.

The male has the legs and cephalothorax darker brown than the female and the black spots on the abdomen larger and surrounded more distinctly with white which sometimes forms a stripe on each side. Each femur has a single row of spines on the under side. The tibiae of the second legs are not thickened. The palpal organs are dark colored. The double terminal hook is long and the other appendages are stout and hard.

This is a common species from the White Mountains to Connecticut and southward. It is often found on fences without any web. The web is usually small, among the leaves of plants.

Epeira juniperi, new.

PLATE XXXIV, FIGURE 6. PLATE XXXVI, FIGURES 14, 15, 16.

Length of female 5.5^{mm}. The abdomen is nearly as broad as long, bright green with three white longitudinal stripes on the back. The cephalothorax and legs are light yellowish brown, without dark rings. The male has the same colors, is slightly smaller and has longer legs. The epigynum has a short wide finger curved toward one side and widened at the end, which lies between the dark brown openings.

The palpal organ has a long pointed basal hook and a short dark colored terminal hook under which is the curved black tube. At the side is a large white process with a tooth on the outer side.

A male and female from a spruce tree on Peak's Island near Portland, Me., July 13, one from Wood's Holl, Mass., in August.

Epeira alboventris, new.

PLATE XXXIV, FIGURE 5. PLATE XXXVI, FIGURE 12.

Length 4^{mm}. Abdomen as broad as long, widest in front. The whole body is white except a triangular purple spot on the back of the abdomen. The hairs on the legs are long and white. The spines are light brown. The eyes are colorless but have some dark color around them. The epigynum is light brown and has a short white finger broad and rounded at the end. Plate XXXVI, figure 12. A spider from Western New York, perhaps of this species, has the whole upper side of the abdomen veined with light red and eight darker red spots along the sides.

One from Peabody, Mass., near Ship rock, one from the north of Maine from F. W. Putnam.

Epeira labyrinthea Hentz.

PLATE XXXIV, FIGURE 8. PLATE XXXVI, FIGURE 11.

Female about 5^{mm} long. The cephalothorax is much longer than wide, dark brown except a white spot around the eyes and several smaller spots along the sides. The legs are white with narrow dark brown rings at the ends of the joints and wider rings of a lighter yellowish brown on the ends of the femora, tibiæ and the patellæ of the first two pairs. There is a small black spot around the base of each spine on the legs of the first two pairs. The abdomen is whitish marked by a distinct black or dark brown folium on the hinder half and including four white spots on the first and second segments, which are more or less connected with each other toward the middle. The mandibles and maxillæ are dark brown. The sternum is dark brown with a white middle stripe. The under side of the abdomen is dark brown with a middle white stripe and indistinct light spots along the edges of the dark area. The male is much like the female but with longer legs and smaller body as usual.

Besides the usual round web, this species makes on one side and above it an irregular web like that of *Theridium* in which is a deep tent with the opening directed toward the center of the round web with which it is connected by a thread. In the autumn the eggs are laid in several flat cocoons which are fastened near the top of the tent, and partly concealed by pieces of leaves and other rubbish fastened to the web. After the leaves have fallen and the webs are destroyed by the weather the string of cocoons and rubbish remains fastened, usually to several twigs, by strong threads.

This species is abundant at New Haven, Conn., and Mr. McCook finds it equally so at Philadelphia. I have one from Lynn, Mass., but none from farther north.

Epeira triaranea McCook.

Proc. Phil. Acad. Nat. Sci., 1876, p. 200 = *E. globosa* McCook, 1878, p. 124 = probably *E. baltimoriensis* or *E. globosa* Keyserling.

PLATE XXXIV, FIGURE 9. PLATE XXXVI, FIGURES 6, 7.

Length five or six millimeters. The cephalothorax is light yellowish brown with a fine dark median line from the eyes to the dorsal groove and indistinct dark marks on the sides of the head. The first and second pairs of legs have indistinct dark rings at the end and middle of each joint. The third and fourth pairs have darker rings at the ends of the joints only and the tibia of the fourth pair is half black. The abdomen is as broad as long or broader. The front half of the folium is covered by four large white, yellow or reddish spots partly united together into a squarish figure surrounded by an irregular black line. The hinder half of the folium has a pair of black spots on each segment between which are light brown markings. The sternum is yellow. The under side of the abdomen has a black spot around the spinnerets and another transverse dark mark just behind the middle, the rest is light yellowish. The epigynum is small with a short blunt finger.

The male is smaller than the female but marked in the same way. The tibiae of the second pair are slightly thickened and curved and have large spines on the inner side.

The spider makes a very large funnel-shaped tent out of which a thread runs to the center of the web, somewhat as in *Ep. labyrinthea*.

Salem and other places in Eastern Massachusetts; New Haven, Conn.; Philadelphia, Pa., McCook.

Epeira carbonaria Koch.

Beitrag z. Kenntniss d. Arachniden fauna Tirols. Zeitschrift d. Ferdinandeums, Innsbruck, 1869 = *Epeira packardii* Thorell, Proc. Boston Soc. Nat. Hist., vol. xvii, 1875.

PLATE XXXIII, FIGURE 18. PLATE XXXVI, FIGURES 18 and 19.

This is an alpine species from the White Mountains. The female measures 8^{mm} long, cephalothorax 3^{mm}, 1st leg 12^{mm}. The head is about half as wide as the thorax and light colored. The thorax is black or dark brown. The legs are ringed with black and white, the black rings usually twice as wide as the white. The coxæ are light

colored and the sternum black or dark brown. The abdomen is black with five or six pairs of white spots down the middle, in some individuals united into a folium. At the sides are other small irregular white spots running into two indistinct stripes underneath. The middle of the under side of the abdomen is black, with a central white strip running from the epigynum half way to the spinnerets. The abdomen is oval, narrower but not pointed behind. The whole body is covered with long black and white hairs. The epigynum projects considerably beyond the body, and the middle is covered by a long finger running out to a fine point, and usually turned outward at the end.

The male differs but little from the female in color and markings, but has the usual longer legs and longer spines.

These spiders live among the bare stones on the upper part of high mountains, above trees. On Mt. Washington, New Hampshire, they are common on the large slopes of bare rock above the Ledge. The spiders described by Thorell were found by Packard in Labrador. F. A. Bowditch has found the same on Mt. Lincoln in the Rocky Mountains, most of them much larger than the White Mt. specimens. *Ep. carbonaria* of the Alps seems to me to be the same species. I have compared many females and find no constant difference, but have no males of *carbonaria* for comparison.

In the valleys of the Alps and all over southern Europe there occurs a closely related species, *Ep. ceropegia*, with similar marking, but bright colors, yellow and brown in place of the black and white. I have not seen any similar species from the White Mountains, but in the Rocky Mountains there is a species or variety very much like *Ep. ceropegia*, and some females from Mt. Lincoln have colors and markings between these two varieties.

Epeira placida Hentz.

PLATE XXXIV, FIGURE 2. PLATE XXXVI, FIGURES 10, 13.

Length of female 3 or 4^{mm}. The cephalothorax is brownish yellow with three brown stripes and black spots around the eyes. The legs are the same color, a little darker at the ends of the joints. All the legs have long dark colored spines. The abdomen is longer than wide, sometimes egg-shaped with the narrow end in front. In the middle is a brown stripe, with black spots along the edges. This stripe is narrow in front but wider behind the second pair of muscular spots and continues the same width to the spinnerets. On the third segment there is a pair of white spots in the brown band. The

rest of the top of the abdomen is white with sometimes light brown oblique lines across the hinder part. The sides and under part of the abdomen are dark brown with oblique whitish spots on the sides, two white stripes below, and four white spots around the spinnerets. The male differs but little from the female in the usual way. The finger of the epigynum is short and blunt between two lobes which extend slightly beyond the edge of the fold. The palpal organs are large for the size of the spider, and the shape of the hard parts characteristic, fig. 10.

Massachusetts, and New Haven, Conn.

Epeira gibberosa Hentz.

Ep. maculata Keyserling, Zool. Botan. Gesellsch., Wien, Aug. 2, 1865.

PLATE XXXIV, FIGURES 1, 1a. PLATE XXXVI, FIGURE 17.

Female 4 or 6^{mm} long. The cephalothorax is dull yellow with a narrow black stripe in the middle from the eyes to the dorsal groove. The legs are dull yellow with long black spines and sometimes narrow longitudinal dark stripes. The abdomen is gray, thickly covered with yellowish spots. In the hinder part are two black lines partly broken into spots, and there are black spots and irregular oblique lines at the sides. The under side of the abdomen is brown with two white lines and four or six spots around the spinnerets very much as in *E. placida*. The epigynum has a short blunt finger much like that of *E. placida*.

The male is somewhat smaller than the female. The palpal organs are large and the appendages long and distinct. The basal process is widened at the end and has a long tooth at each corner, with several shorter ones between. Near the basal process is a narrow, soft appendage which extends outward nearly to the terminal hook. The other appendages are the tube and a black process of nearly the same size just below it, and a short black process on the opposite side of the organ.

Massachusetts; Providence, R. I.; New Haven, Conn.

Epeira parvula Keys., Sitzungsberichte der Isis, Dresden, 1863.

PLATE XXXIV, FIGURES 12, 12a, 12b, 12c. PLATE XXXVII, FIGURES 1 AND 2.

Adult female from Mt. Tom, Mass., 8^{mm} long. Male from New Haven, 6^{mm} long.

The abdomen is widest in front at the second segment. The back is flat with a slight hump behind, which projects backward beyond

the spinnerets, giving a triangular appearance to the abdomen. The folium is widest on the first segment and tapers backward to a narrow stripe. The colors are variable. Usually there are two white spots in the first segment of the folium, and behind this the folium is dark gray, darkest at the edges, and surrounded by a white line. The sides of the abdomen are lighter gray with dark oblique lines. In the middle of the folium are often several light spots in pairs. In some specimens the folium is light colored and surrounded by darker gray. Some specimens have the folium and all the markings on the back indistinct except a black stripe down the middle. The sternum is light in the middle and there is a light spot just behind the epigynum. The cephalothorax is gray, darker at the sides and behind. The legs are gray with indistinct darker rings at the ends and middle of each joint. At the end of each femur is a wide dark ring. The epigynum in the only adult female is covered by a wide finger tapering to a point.

The male is smaller and darker and has longer spines and wider dark rings on the legs. The palpal organ has a very large terminal hook and a large rough process at its base, both of which are folded down against the palpal organ. On the outer side of the organ is the tube and a hard curved process which supports the tip.

The adults are found in June and July and great numbers of young in the autumn and winter. They live in all sizes of shrubs and bushes and in low trees.

White Mountains; Massachusetts and Connecticut.

Epeira foliata Hentz.

PLATE XXXVII, FIGURES 6, 7, 8, 9, 10.

This spider resembles *Ep. parvula* but the legs are longer and the abdomen less triangular. The female measures 6^{mm} long and the first leg 12^{mm}. The second leg is nearly as long but the fourth is much shorter. The cephalothorax and legs are grayish or greenish yellow, darker toward the ends of the joints. The first and second legs are darker and have dark rings in the middle of the tibia and tarsus. The abdomen is gray. The folium is slightly darker at the edges and is bordered by a white line. In the middle is a darker stripe ending in a point at the third segment, and also bordered by a black and white line. Beneath the body is dull yellow. The epigynum has a finger which is so wide at the base as to cover it. The tip of the finger is curved backward and slightly flattened.

The male is a little smaller but otherwise resembles the female.

The tibia of the second pair is widened in the middle and has four large spines on the inner side. The palpus has a flat hook at the base of the tarsus, ending in two teeth. The parts of the palpal organ are small except the basal process, which is very large and wide with two prominent teeth.

Swept from bushes in June, New Haven, Conn.

Epeira stellata Hentz.

PLATE XXXIV, FIGURE 17. PLATE XXXVII, FIGURES 3, 4, 5.

Female 12^{mm} long. The abdomen has a sharp hump on the front, one behind and five on each side. The hinder hump has a smaller one under it and the lateral humps on the first segment are sometimes double. The colors are light and dark brown, somewhat modified by the gray and white hairs. The markings resemble those of *Ep. angulata*. The edges of the folium run out toward the humps. The cephalothorax is wide and the corners of the head are extended forward a little beyond the eyes. The legs have dark rings at the end and middle of each joint. The sternum has a light stripe in the middle. The under side of the abdomen is wrinkled and has several oblique dark stripes. The epigynum is covered by a hooked finger, as in *domiciliorum*.

The male is slightly smaller but otherwise much like the female. The palpal organ is small with short appendages.

A common spider in Massachusetts and Connecticut on grass and low bushes; Dublin, N. H., July, 1882.

Epeira infumata Hentz.

E. ectypa Keyserling, Sitzungsberichte der Isis zu Dresden, 1863.

PLATE XXXVII, FIGURES 11, 12, 12a, 12b, 13.

This spider when it draws up its feet has the appearance of a lump of dirt. The color is dark brown with various black and white markings and reddish spots on the back of the abdomen. The cephalothorax is about 2^{mm} long. The head is high and flat in front, bringing the upper middle eyes directly over the front pair, while the lateral pairs are turned around so as to lie in a horizontal line. The upper middle eyes are much larger than any of the others.

The abdomen extends forward over the thorax and is very high in front, where it has a pair of humps. At the middle the abdomen is nearly as wide as long and nearly flat on the back from the humps to the hinder end. The abdomen is marked with a tolerably distinct folium, with the hinder segments marked by pairs of oblique black

spots. Toward the front, the folium is a little reddish and at the sides yellow. The legs are yellowish, nearly covered by irregular dark rings and spots. The sternum is bright yellow in the middle and black around the edge. The abdomen is black beneath. Another specimen is much paler with the legs almost white, and the markings of the back broken up into a few gray spots.

Both specimens are females.

New Haven, Conn., June and July.

Microepeira, new.

This genus is distinguished by its small size and large epigynum and palpal organs, and also by its web, which according to McCook has the rays united in groups of three or four, and is drawn into a conical shape by a thread attached to the center.

Microepeira radiosa (McCook), Proc. Phil. Acad. Nat. Sci., 1881.

PLATE XXXIV, FIGURE 7. PLATE XXXVIII, FIGURES 1, 2, 3, 4.

This spider is only 2^{mm} long. The cephalothorax is gray without any distinct markings, except black rings round the eyes and slightly darker stripes on the thorax. The legs are yellowish white, darker at the ends of the joints. The abdomen is nearly spherical. The back is white with brown markings. The folium is not well defined but is plainer behind than in front, and consists of two rows of irregular brown spots, the pair on the first segment being separate from the others. In the middle is an irregular brown line. The sternum has a light stripe in the middle and is brown at the sides. The under side of the abdomen is dark. The epigynum is very large and triangular seen from behind. The opening is round and partly covered by a thin plate that extends across the abdomen just behind the epigynum.

The male differs but little in size and color from the female. The palpal organs are very large. The tube is black and long, supported by a hard brown appendage. Fig. 1.

I have this species from the White Mountains, N. H., and from Waverly near Boston, Mass.; and from H. C. McCook from Philadelphia, Pa.

I have never noticed the web, but according to Mr. McCook (Proc. Phil. Acad. Nat. Sci., 1881) the rays instead of all pointing to one center are united in groups of three or four, each group connected with the center by a single thread. The web is drawn into the shape of an inverted umbrella by a thread extending from the center to a

neighboring twig and held tight by the spider, who releases it suddenly to aid in entangling insects in the web.

Cyclosa Menge.

Preussische Spinnen, 1866. Simon, Arachnides de France.

Cyclosa conica (Pallas) Menge = *Ep. caudata* Hentz = *Ep. conica* Blk.

PLATE XXXIV, FIGURES 3, 3a. PLATE XXXVIII, FIGURE 11.

This spider is about 6^{mm} long. The color is white and gray, varying from almost white to almost black. The abdomen of the female has a prominent hump at the hinder end varying in size in different individuals. In the male there is only a slight trace of the hump. The cephalothorax is longer than wide and highest behind the middle. The color of the cephalothorax is dark gray or black with sometimes a light area just behind the eyes. The legs are white with dark rings at the end of each joint and in the middle of each joint except the femora on which there is only a mark on the under side. On the first and second femora the dark ring is very wide, covering sometimes more than half the joint. In light individuals the markings on the abdomen are obscure, but in well marked specimens there is a dark folium widest near the base of the hump and broken in two places at the sides. The sides of the abdomen and the back part between the hump and the spinnerets are marked with irregular black and white or yellow lines. The under side is black with a pair of very distinct light spots across the middle. The sternum is dark.

The male is smaller than the female, has a smaller hump and a wider and darker thorax. The palpi are large. The tarsus is small and pointed at the end and does not cover the large palpal organ. The tube is long and hair-like, supported at the end by a stout hooked process. Fig. 11. The epigynum is nearly all external. It is widest at the outer end and has a small finger.

Mt. Washington, N. H.; Eastport, Me.; Albany, N. Y.; Eastern Massachusetts; and New Haven, Conn.

This species seems to live all the time in the web. Across the web there is usually a line of dead insects and other rubbish fastened together with a quantity of loose web in which the cocoons are also concealed. The spider standing in the middle of this band where it crosses the center of the web looks like part of the rubbish.

Singa.

In *Singa* the metatarsi of the first and second feet have only very small spines or none. The eyes are smaller than in *Zilla* and the

head higher. The colors are orange, brown and black, usually bright. They live on low plants in open fields near water.

Singa variabilis, new.

PLATE XXXIV, FIGURES 16, 16a, 16b, 16c. PLATE XXXVII, FIGURES 19, 20, 21

Female 4^{mm} long, a little smaller than *pratensis*. The legs and cephalothorax are light orange except the front of the head around the eyes which is black. The abdomen varies considerably in color. In a large proportion of them it is entirely black. In others there are two white stripes of various lengths along the sides, all the rest being black. Others have a light stripe in the middle in addition to the side stripes. Still lighter individuals have a white stripe in the middle and others at the sides. Between these are brownish areas in which are two or three black patches of various sizes and shapes. These latter individuals resemble in markings the other species. The males are smaller but similarly marked. The palpal organs are black.

This is found in grass in wet meadows with the other species, all varieties of color occurring together.

Peak's Island, Portland, Me.; Eastern Massachusetts; New Haven, Conn.

Singa pratensis, new.

PLATE XXXIV, FIGURES 15, 15a. PLATE XXXVII, FIGURES 14, 15, 16, 17.

Female 5 or 6^{mm} long; cephalothorax 2^{mm}; first leg 5^{mm}. Cephalothorax light yellow in the middle and on the head, brownish at the sides. Legs dull yellow, darker at the ends of the joints. Abdomen light brown with a double white stripe in the middle and a white stripe each side. Underneath there is a brown patch in the middle with a yellow stripe each side and small yellow spots around the spinnerets. The sternum is dark brown. The abdomen is large and regularly oval. The legs are short and small. The metatarsi of the first and second pairs have only very small and few spines. The epigynum is small.

The male has the abdomen much smaller than the female and the markings less distinct. The cephalothorax is as large as that of the female, but the head is a little narrower and the middle eyes a little farther advanced. The legs are stouter than in the female and have much longer spines especially on the tibiae.

In grass on wet ground, Salem and Holyoke, Mass., and New Haven, Conn.

Singa maculata, new.

PLATE XXXVII, FIGURE 18.

Length 3^{mm}. The head is as high as wide, narrowed a little around the eyes. The front middle eyes project forward over the mandibles in both sexes. The front half of the head is black, the rest of the cephalothorax and legs orange. The abdomen in my specimens is orange with indistinct blackish markings across the hinder part, but the pattern is probably variable as in other species. Beneath, the colors are pale brown and orange. The epigynum resembles that of *S. variabilis*.

Male and female, New Haven, Conn., June 24.

Zilla.

These spiders resemble *Steatoda*. The abdomen is large oval and smooth and the legs short. The head is narrow and the lateral eyes as near the middle pairs as these are to each other. The colors are dull, black, gray and white.

The webs have a segment without cross lines in which a stout thread runs from the center to the nest. Insects caught in the web are rolled up in silk, attached to the spinnerets and carried along the thread to the nest. Plate XL, fig. 2.

Zilla montana C. Koch.

PLATE XXXIV, FIGURE 11. PLATE XXXVII, FIGURES 22, 23, 26, 28.

Length of female 6 or 7^{mm}. Cephalothorax yellowish white with dark edges and an indistinct gray stripe in the middle with radiating branches to the legs and side eyes. The legs are the same color with dark rings at the end of each joint and less distinct rings in the middle of each joint. The abdomen is oval and flat above like that of *Steatoda* and the markings resemble those of *Steatoda marmorata*. The folium is black at the edges but nearly white in the middle where there is a median dark line or row of spots. On the front end of the abdomen is a white spot surrounded by black which indents the sides and front end. The folium is broken near the hinder end as in *Steatoda marmorata*. The sternum is dark with a middle yellow stripe. The under side of the abdomen has a black stripe in the middle with a yellow stripe on each side. The male has longer legs with longer and darker spines but otherwise resembles the female.

I have this spider from the White Mountains and young from the Adirondacks. The web has a narrow segment without cross lines, Plate XI, figure 2, in which is a single thread by which the spider passes from the center of the web to the nest. Near Hermit Lake on Mt. Washington I saw one of these spiders capture a fly and after tying it up with silk carry it along the thread to its nest.

I have compared the females with one from Switzerland with which it agrees very closely, but have not compared males. In the male characters it agrees with descriptions of *Z. montana*.

Zilla X-notata C. Koch.

PLATE XXXIV, FIGURE 13. PLATE XXXVII, FIGURES 24, 25, 27. PLATE XL, FIG. 2.

This species is about the same size as *Z. montana* and similarly colored. The legs are whitish with dark rings at the ends of the joints, and less distinct ones in the middle. The spines of the legs are black with black spots around the base. The cephalothorax is whitish with a fine black line on each side and a wide dark stripe in the middle of the head and nearly covering it, and tapering to a point near the dorsal groove. In this dark stripe are three black lines converging behind. The abdomen is marked with a grayish folium scolloped at the edges, which are black in irregular spots. The middle of the folium is whitish, lightest in front, where it is bordered by black. In the hinder part are two or three pairs of black spots which are sometimes united into transverse black stripes, in front of each of which is a white line or pair of spots. Outside the folium is a white line, and beyond this the sides are covered with oblique black bands that in some individuals nearly touch each other. Under the abdomen is a middle black stripe from the stem to the spinnerets. The epigynum is black and much smaller than in *Z. montana*. The males have the first and second pairs of legs much longer than the female, the palpal organs are smaller than those of *montana*, and the tibia of the palpus is more slender.

This spider was abundant at Wood's Holl, Mass., in the summer of 1883, chiefly under the Light House wharf, where it lived in company with *Epeira sclopetaria* in about equal numbers. The nest is a tube usually open at both ends attached in a crack or corner. The webs were of the usual *Zilla* pattern with a vacant segment near where the thread passes to the center from the nest. Where the nest was so placed that this thread formed a large angle with the plane of the web, the web* was sometimes complete as in *Epeira*.

The web is begun like that of an *Epeira*, but after the smooth

spirals have been placed over about a quarter of the web the spider begins to turn back on reaching the ray next the thread to the nest and passes around to the next on the opposite side. When the final spirals are put on, this segment is left open from the circumference to the center. After catching and tying up an insect she attaches it to the spinnerets and carries it to the nest.

Many trees have been brought to Wood's Holl from the north of Europe for cultivation, so that it is possible for these spiders to be imported. I have not seen them nor heard of their presence elsewhere in New England.

Cyrtarachne Thorell.

Voyage of the Swedish frigate, *Eugenie*, 1868 = *Cyrtogaster* Keyserling, Sitzungsberichte der Isis, Dresden, 1863.

The name *Cyrtogaster* was used earlier for a genus of *Hymenoptera*.

These spiders are all short with the abdomen wide in front and partly covering the thorax and usually have spines on both thorax and abdomen.

Cyrtarachne bisaccata, new.

PLATE XXXIV, FIGURES 11, 11a.

Female 8^{mm} long. Abdomen 8^{mm} wide. The head is low and wide. The eyes all small, the four middle forming nearly a square on a slight elevation. The head is slightly narrowed behind the eyes. The cephalothorax is slightly scolloped at the sides. It rises from the eyes backward and has at the highest part behind the middle two large horns. The back is covered with conical scattered points. The cephalothorax is light brown darkest in front. The abdomen is wider in front than long and extends over the thorax as far as the two horns. The four principal muscular spots are large and dark brown. The front of the abdomen is light brown with various whitish irregular markings, the back part is yellowish white. The under side of the body and legs are white except the ends of the first and second femora which are grayish.

Only one specimen of this was found on a beech tree at New Haven, Conn., Oct. 22, 1882, with two cocoons. These were dark brown, as dark as the bark of the tree and as hard. Around the middle of each was a circle of irregular points. Pl. xxxiii, fig. 12. One of the cocoons was attached by a strong stem to the bark and the other was attached in a similar way to the first cocoon. The spider held on to one of the cocoons. The following spring another similar pair of cocoons were found on a low oak tree in Pine Swamp,

New Haven, still firmly attached to the bark. From these the young came out in June.

Acrosoma Perty.

These spiders have the abdomen flattened on the back and surrounded by several pairs of spines of various sizes and shapes. The abdomen is large and extends backward beyond the spinnerets which appear to be in the middle of the under side. The cephalothorax is not as wide as long. The legs are slender and the hinder pair as long as the first or longer. The colors of the abdomen are bright. The males differ much from the females, resembling the young in form and color.

Acrosoma rugosa = *Epeira rugosa* Hentz.

PLATE XXXVIII, FIGURE 10.

This is about the same size as *A. spinea*. The legs are shorter and stouter. The cephalothorax has three dark stripes. The legs and cephalothorax are both covered with short hairs at the base of each of which is a slight elevation. The abdomen is higher than in *spinea* and dull yellow with irregular black spots above and below. The abdomen extends backwards half its length beyond the spinnerets. It is square at the posterior end and has five pairs of spines of which three pairs are along the edges of the flat upper side and two pairs behind.

The male is described by Hentz, who saw them pairing. It differs very much from the female, having a long narrow abdomen without any humps or spines.

This species is evidently not common in New England, the only one I know is in the museum of Yale College from New Haven, Conn. The figure is from a specimen from Indiana.

Acrosoma spinea = *Epeira spinea* Hentz.

PLATE XXXVIII, FIGURES 5, 6, 7, 8.

The adult female of this species is distinguished from all the other native *Epeiridae* by its triangular abdomen with the hinder angles extended to two sharp spines half as long as the rest of the abdomen. The abdomen is bright yellow or white above. The spines are black at the tip and reddish or orange at the base. There are two black spots at the front end of the abdomen and the muscular spots are black. Besides the two posterior spines there are two

other pairs, one pair near the front end of the abdomen and another smaller on the sides half way back. The body of a full grown female is about 7^{mm} long, and the distance between the tips of the spines is equal to the length of the body. The legs and cephalothorax are yellowish brown, the latter with whitish edges. Underneath, the abdomen is strongly wrinkled and marked with black bands and yellow spots. The posterior spines are lighter on the under side. The young differ greatly from the adult female. The abdomen is longer than wide. The posterior spines are short and blunt and the general color of the body is dark brown. There are two light spots just in front of the base of the spines and other smaller ones on various parts of the abdomen. The two hinder pairs of legs are whitish with longitudinal dark stripes. The first and second pairs are dark toward the base and white at the tips.

The males resemble the young. They are about 4^{mm} long. The abdomen is long and widest behind and truncate without any spines except slight humps. On each side of the abdomen are three black spots in which are slight humps. Across the hinder part of the abdomen are four light spots as in the young. The cephalothorax is dark brown and the legs light yellow with dark markings as in the young.

They become adult the last of July and are found till October. They are common in Massachusetts and Connecticut. The webs are usually in low bushes and the adult females seem to hang all the time in the webs.

Acrosoma mitrata = *Epeira mitrata* Hentz.

PLATE XXXVIII, FIGURE 9.

This is a much smaller species than *spinea*, measuring 4 or 5^{mm} long. The abdomen of the female extends forward so as to cover half the cephalothorax. It is three-fourths as wide as long and square at the hinder end where it has two pairs of spines. The abdomen is white or yellow above. There is a dark spot of variable size and shape over the first segment and a dark middle stripe between the hinder spines. There are also numerous black muscular spots. Below the abdomen is wrinkled and marked with black and yellow very much as in *spinea*. The cephalothorax and legs are brownish yellow. The cephalothorax is shorter than in *spinea*, the front of the head square and the sternum nearly circular.

Common at New Haven, Conn. I have not found it in Eastern Massachusetts nor farther north.

Meta.

I use this genus for *Meta menardi*, *merianæ* and the like, not including the slender bright colored species placed here by Keyserling which, as suggested by Thorell, better form another genus. They have longer mouth parts than *Epeira* and the abdomen is deeper, more like *Theridium*. They live in caves or shady places.

Meta menardi (Latr.) Thorell = *Epeira fusca* Blkw.

PLATE XXXIV, FIGURES 18, 18a. PLATE XXXVII, FIGURE 33.

Adult female, 14^{mm} long; cephalothorax, 5^{mm} long, 4^{mm} wide; first leg, 28^{mm}. The hinder part of the cephalothorax is as high as the head except a deep pit in the middle. The legs are yellow with wide dark-brown rings at the end and middle of each joint. The cephalothorax is brownish yellow, darker in the middle and at the sides. The abdomen is high in front and pointed behind, as in *Theridium tepidariorum*. It is dark brown and dull yellow. At the front end are two dark-brown patches, between which is a light stripe which spreads out toward the four principal muscular spots. Behind this are several light cross lines. Underneath the abdomen is brown with two yellow stripes. The epigynum is covered by a wide, short and thick hook turned backward. The cocoon is large but so loose that the eggs can be seen through it. The webs are horizontal or inclined, with a hole through the center.

The male is about half as large as the female and colored the same. Both patella and tibia of the male palpi are wide as long. The tarsus is large and nearly as wide in the middle as long. At the base is a large hard process turned upward, and on the outer side of this is a light colored branch covered with hairs. The palpal organ itself does not fill the hollow of the tarsus. The tube is straight and lies by the side of a hard process of equal length. At the base of the tube is a shorter rough process.

This species lives in caves and other damp and shady places, Berlin Falls, N. H., Boston, Mass. Caves in Kentucky and Virginia.

Argiope.

In *Argiope* the eyes and mouth parts are as in *Epeira*. The abdomen is longer than wide and pointed behind. The sexes differ greatly in size, the males being extremely small. The females live all the time in the web having no nest or tent. The thorax and, in the young, the abdomen are covered with silvery hairs. The colors of the abdomen are very bright often black cross stripes on a yellow

ground, or as in *riparia* the middle portions of these stripes are united together into a longitudinal black middle band. The webs are crossed in the middle by a wide zigzag white band that partly conceals the spider when young. The cocoons are large and stiff like paper on the outer surface. The eggs are laid in autumn, and the young hatch during the winter and leave the cocoons early in the summer, becoming adult in August.

Argiope riparia = *Epeira riparia* Hentz and *E. sutrix* Hentz.

PLATE XXXIV, FIGURE 19. PLATE XXXVIII, FIGURES 13, 14, 19.

This is one of the largest and most conspicuous native species of the family. A large female measured 20^{mm} long; cephalothorax, 8^{mm}; first legs, 50^{mm}. The cephalothorax is nearly as wide as long and covered with silvery white hairs, except around the eyes where it is black. The front legs are entirely black, the others have the femora reddish or yellow and the rest black. The abdomen is oval, a little pointed behind and slightly notched in front, with two humps at the corners. The folium is black, narrowed between the humps, and widening again around the large yellow spots of the second segment. It extends to the end of the body about the same width, with scollops and branches on each segment. Along the sides of the folium are two bright yellow longitudinal bands or rows of irregular spots, and in the folium are two pairs of rounded yellow spots on the second and third segments. Underneath the color is black with a yellow stripe on the sternum, and four pairs of small yellow spots in the middle and two wide yellow stripes on the sides of the abdomen. Around the spinnerets are two large triangular yellow spots and one or two pairs of smaller ones. The sides of the abdomen below the large yellow spots are marked with irregular oblique lines of black and yellow. The epigynum is covered by a long brown process directed backward and covering the openings entirely.

The young of this species differ considerably from the adult. Until nearly full grown the legs are distinctly marked with dark rings on the ends and middle of each joint, the ground color being white or pale yellow. When very young the abdomen is more slender, the color is pale yellow, and the markings gray without any of the strong black and yellow of the adult. Hentz's *Epeira sutrix* is perhaps the young *riparia* at this stage.

The male differs greatly from the female. It is only 5 or 6^{mm} long. The colors and markings resemble those of the female but are gener-

ally less bright and sharp. The dark marks on the sides of the thorax, which are nearly concealed by the hairs in the female, are more distinct in the male and cover a large part of the thorax. The legs are dark brown, lighter toward the tips and covered with dark hairs and black spots. The palpi are very large in proportion to the size of the spider. The palpal organ is large and nearly all exposed outside the tarsus. The tube is flat and slightly barbed at the end, and is supported by a long, thin paddle-shaped appendage, and a shorter one with a thin tooth on one side. Fig. 14.

This species makes a strong web, usually more or less inclined, in grass or low bushes, generally near water or on wet ground. The middle of the web is usually crossed by a white zigzag band of silk, which is of no apparent use to the adult spider, but when young helps to conceal it, especially when the web is much inclined. On one or both sides of the round web and within an inch or two of it, the spider often makes a loose irregular web. The female seems to remain all the time in the center of the web, making no tent or nest for concealment. The male often occupies a corner of the female's web, among the irregular threads to which he perhaps adds some of his own. In copulation the male lays flat against the under side of the female's abdomen, clasping his legs around it. While seeking to do this he runs about lightly over the female, and if attacked by her drops off the web to the ground.

In September the female lays in a large pear-shaped cocoon with a brown paper-like surface hung by numerous threads in grass or bushes. Inside the papery surface is a mass of loose web surrounding the eggs, which are packed closely together under a cup-shaped cover attached to a thick stem of silk running through the middle of the cocoon. From cocoons found unfinished it appears that the stem and cup are first made and the eggs attached in a lump underneath, and afterward covered with the loose thread. The young hatch in the fall or winter but remain in the cocoon until May or June.

Common in Massachusetts and southward.

Argiope transversa = *Epeira fasciata* Hentz.

PLATE XXXIV, FIGURES 20, 20a. PLATE XXXVIII, FIGURES 15, 16, 17, 18.

This species is somewhat smaller than *riparia*. The cephalothorax is 5^{mm} long and the whole body measures 15 to 20^{mm}. The first leg is 25^{mm} long. The abdomen is more pointed behind than in *riparia* and the markings very different. The ground color is white or

yellow and is crossed by a great number of black transverse lines, three on each segment, which are sometimes obscured, especially in young spiders, by a thick covering of silvery white hairs. The cephalothorax is covered with white hairs through which the dark markings on the sides of the thorax show indistinctly. The legs are light yellow with black bands around the ends and middle of each joint. The femora of the first legs are sometimes entirely black. The epigynum is uncovered, showing two openings separated by a slight ridge. The colors and markings under the body are like those of *A. riparia*. The young of this species have the back entirely white until nearly full grown.

The male is about 5^{mm} long. The legs and cephalothorax are yellowish and the abdomen white. The markings underneath are similar to those of the female but paler. The legs are yellowish, marked with black spots but no rings. The cephalothorax is rather wider than in the male of *riparia* and does not have the dark marks along the sides. The palpi are very different from those of *riparia*. The tube is coiled once around the end of the bulb, the tip turned slightly outward. It is accompanied by two hard appendages, as in *riparia*, but these are shorter and somewhat twisted with the tube.

This has the same habits as *riparia*, and is found with it in the same bushes. It remains in its webs rather later in the fall than the other species. The cocoons are flat on top, not narrowed into a stem.

I have females from the Adirondack Mountains, collected by F. A. Bowditch, and from Ottawa, Canada, J. B. Tyrrell. In Eastern Massachusetts it is very common, especially near the sea-shore. Near New Haven, Conn., it is found with *riparia* but neither is common. It extends southward probably as far as Florida.

This species was called *Epeira fasciata* by Hentz, who supposed that it might be identical with the *Epeira fasciata* or *bruennichii* of Europe. The differences in the epigynum and male palpi are enough to separate the two species. In *bruennichii* the epigynum is covered by a process directed backward as in *riparia*, while in *transversa*, the two openings are uncovered. The males of *bruennichii* are proportionately larger than those of *transversa* and have more distinct markings on the abdomen and thorax. The tube of the palpal organ is less twisted than in *transversa*.

Argyropeira, new.

These spiders have long slender legs like *Tetragnatha*. The abdomen is long and round but often thicker in the middle and never as

slender or long as in *Tetragnatha*. The colors are bright green and yellow with black and silvery markings on the abdomen. The maxillæ are long as in *Meta*. The lateral eyes are widely separated from the middle ones. The male palpi are long and the palpal organ large and rounded and only partly covered by the tarsus. Keyserling includes these in the genus *Meta*, and Walckenaer in *Tetragnatha*, 2nd family.

Argyropeira hortorum (Hentz) = *Epeira hortorum* Hentz.

PLATE XXXVII, FIGURES 29, 30, 31, 32.

Length 5 or 6^{mm}; first leg 14^{mm}. The abdomen is round and about twice as long as wide and nearly as thick at the hinder end as in front. The abdomen is silvery with transparent marks over the dorsal vessel and its branches. Sometimes there is a black line along the middle and another each side. On each side there is also sometimes a bright yellow stripe. Underneath the body is black mixed with greenish spots. The legs are green or yellowish with narrow black rings at the end of each joint. The cephalothorax is green or yellow with a fine black line on each side. The epigynum is dark brown and only very slightly raised and divided at the edge of the fold into three parts by shallow grooves.

The male is about half as large as the female, with the legs much longer, the first pair being 17^{mm} long. The male palpi are longer than the cephalothorax. The patella is about as short as thick, and the patella and tibia together are nearly as long as the femur. The tarsus is small and oval. The other appendages of the palpal organ project beyond the tip.

New Haven, Conn.; Milton, Mass.

Tetragnatha.

In *Tetragnatha* the body is long and slender. The eyes are in two rows variously curved. The legs are long and slender, and when the spider rests in the web, are extended in front and behind parallel with the body. The colors are light brown and yellow with silvery spots and bands above and darker with yellow stripes beneath. Sometimes the whole body is bright green with white and red markings. The mandibles are long, and longer in males than females. Besides the teeth on the inner side of the mandibles, the males have an additional tooth on the upper side near the tip which curves forward and is usually forked at the end. The webs are often inclined or horizontal and are usually near water on low plants.

Tetragnatha vermiformis.

PLATE XXXIX, FIGURES 12, 13, 14.

The females of this species have the abdomen long and straight and measure 10 or 12^{mm} long, cephalothorax 3^{mm}, mandibles 2^{mm}, first leg 21^{mm}.

The upper row of eyes is curved backward as in *laboriosa*. The front lateral eyes are widely separated from all the others, twice as far from the middle pair as these are from each other. The cephalothorax is dull yellow with dark stripes in the middle and on the edges. The abdomen has a distinct folium with scalloped edges and a light line in the middle.

The male is smaller than the female. The mandibles are not much longer than those of the female, and the teeth are not much larger.

Beverly, and Middleton, Mass.

Tetragnatha extensa Linn., Thorell, etc.

PLATE XXXIX, FIGURES 9, 10.

Length of female 7 to 10^{mm} according to size of abdomen, cephalothorax 3^{mm}, mandibles 2^{mm}, front legs 20^{mm}, palpi 5^{mm}.

The legs and cephalothorax are browner yellow than in most species and sometimes the cephalothorax has three indistinct brown stripes and the legs brown spots at the ends of the joints, and around the bases of the hairs. The sternum is the same color as the legs, occasionally showing a lighter stripe in the middle. The abdomen has various dark and light brown markings, sometimes forming a narrow folium on a light ground, on each side of which is a dark and light line. The abdomen is comparatively short, being $\frac{1}{3}$ to $\frac{1}{4}$ as wide as long. The rows of eyes are only slightly curved backward. The lateral eyes are nearer together than the middle ones, and are usually surrounded by black rings so that they appear to touch each other. The mandibles are two-thirds as long as the cephalothorax, and not much inclined forward.

The male is somewhat smaller and more slender than the female, but the legs are no shorter, and the mandibles slightly longer and more slender. The palpi are 4^{mm} long, the femur 2^{mm}. The tibia is nearly twice as long as the patella. The second tooth on the upper side of the claw groove of the mandibles is much longer than the others.

Northern New York; White Mts.; Massachusetts and Connecticut.

It appears to be the species common all over Europe. I have compared specimens from France and Germany.

Tetragnatha grallator Hentz.

T. grallator Keyserling, Beitrage zur Kenntniss der Orbitelariæ Verhandlungen Zool. Bot. Gesellschaft, Wien, 1865.

T. elongata (Walck.) Thorell in Bulletin of Hayden's U. S. Geological Survey of the Territories, vol. iii, no. 2. Thorell describes several varieties and thinks it probable that this is the same as the European *T. extensa*.

PLATE XXXIX, FIGURES 1, 2, 3, 4, 5, 6.

T. grallator is the largest New England species. The female is 10 or 12^{mm} long, cephalothorax 3½^{mm}, mandibles as long as the cephalothorax, front legs 35^{mm} long. Colors as in *extensa*, varying from light yellow to dark brown. In dark individuals, three stripes on the cephalothorax and the markings on the abdomen are very distinct. The abdomen is often twice as wide near the front end as farther back. The mandibles are turned forward in some individuals nearly horizontal. On the upper edge of the mandibles are two teeth near the end, one large and one small, and seven small ones toward the basal end of the claw groove. The lateral eyes are close together.

The male is somewhat smaller, and has jaws longer than the cephalothorax. The spines on the under side of the claw groove are very small except one near the end, which is curved forward. On the upper side of the groove the second tooth is large and prominent. Behind this are five teeth of the usual size, followed by five or six very small ones close together. Palpi 6^{mm} long, tibia twice as long as the patella and both together as long as the femur.

Eastern Massachusetts; Central New York.

Tetragnatha laboriosa Hentz.

Keyserling, Zool. Bot.n. Gesellschaft in Wien, 1865.

PLATE XXXIX, FIGURES 7, 8, 11, 19. PLATE XL, FIGURE 7.

Length of female about 7^{mm}. Smaller than *extensa* and *grallator*. Cephalothorax 2-2½^{mm}; first leg 12-17^{mm}. Mandibles short, about half as long as the cephalothorax. Lateral eyes as far apart as the middle ones. The legs and cephalothorax are light yellow. The abdomen is dark beneath with two light stripes. The back of the abdomen is sometimes silvery white with transparent stripes over the dorsal vessel. In other individuals there is a very plain folium with dark and light stripes along the sides. A few, apparently of this species, had the abdomen bright green with a white stripe each

side of the folium along the lower edge of which and on the front end of the abdomen were irregular red spots. They were found in white pine trees, Essex, Mass.

The males are a little smaller and have the abdomen more cylindrical. The mandibles are two-thirds as long as the cephalothorax. The tibia of the palpus is short, not much longer than the patella, and both together are a little more than half as long as the femur.

The second tooth on the upper side is the longest, and from this four or five other teeth decrease gradually in length to the base.

White Mountains to Connecticut.

Tetragnatha straminea, new.

PLATE XXXIX, FIGURES 15, 17, 20, 21.

Female 10^{mm} long; cephalothorax 2½^{mm} long, 1½^{mm} wide; first leg 22^{mm}; mandibles 1½^{mm}.

The hinder row of eyes is curved backwards more than in *laboriosa*, and the lateral eyes are farther apart. The abdomen is silvery white above and dark beneath with two light stripes. The cephalothorax is light yellow with two parallel gray stripes. The legs are light brownish yellow. The abdomen extends backward about half its diameter beyond the spinnerets. It is long and slender, thickest toward the front end and seldom swelled out in the middle as in *laboriosa*.

The males are smaller and more slender but their legs are no shorter than those of the females. The palpi are longer than those of *laboriosa*. The tibia is as long as the tarsus and nearly twice as long as the patella. The mandibles are about two-thirds as long as the cephalothorax. The arrangement of the teeth differs but little from that of *laboriosa*.

Eastern Massachusetts; New Haven, Conn. Adults from May to July.

Tetragnatha caudata, new.

PLATE XXXIX, FIGURES 16, 22.

Two females from Malden and Dedham, Mass., resemble very closely *T. straminea*, except in the shape of the abdomen, which is longer and has a tail about a quarter its length, extending backward beyond the spinnerets. The shape of the abdomen of *straminea* seems to be very constant, so that this is probably another species.

Pachygnatha.

The genus *Pachygnatha* has been generally classed with the *Therididæ* near *Steatoda* and *Erigone* on account of its terrestrial habits and the absence of any apparent web. In structure it however resembles *Tetragnatha*, especially in the copulatory organs of both sexes. It resembles *Tetragnatha* also in the large mandibles and in the colors and markings. It does not, however, spin a geometrical web, nor apparently any web, but is always found under leaves and stones near the ground. The feet do not have toothed hairs under the claws. In general appearance these spiders resemble *Steatoda*. The abdomen is oval and rounded and smooth on the back. The cephalothorax is widened in the middle. The sternum is wide and hard.

Pachygnatha brevis Keys.

Zool. Bot. Gesellschaft, Wien, 1883 = *Pachygnatha tristriata* Keys., Zool. Bot. Gesellschaft, Wien, 1882.

PLATE XXXIV, FIGURE 21. PLATE XL, FIGURES 8, 10.

This is the common large and light colored species. The whole body is 5 or 6^{mm} long, the abdomen and cephalothorax about equal in length. The legs and cephalothorax are light brownish yellow, the latter with three dark brownish bands. The abdomen is light yellow with an indistinct grayish folium, in the middle of which is a white band. The mandibles, maxillæ and sternum are dark reddish brown. The under side of the abdomen is gray except two yellow longitudinal stripes. There is but little difference between the sexes in size, color or the general shape of the body. The middle eyes nearly form a square, the hinder pair being slightly the farthest apart. The lateral eyes almost touch each other. The mandibles are stout and in both sexes more than half as long as the cephalothorax and as far apart at the tips as they are long. Under the claw groove are three or four small spines and above the groove three larger ones which are larger and the terminal one more prominent in the males. The maxillæ are obliquely truncated at the ends as in *Erigone*, and thickly haired on the inner edges beyond the lip. The lip is shorter than wide. The sternum is in front nearly as wide as long but tapers backward so that the coxæ of the hind legs almost touch. The opening of the reproductive organs is just back of the spiracles in the male, but as far back as the middle of the abdomen in the female.

Males and females are found under leaves in damp woods at all seasons and occasionally under stones without webs.

Montreal, Canada ; Eastern Mass. ; New Haven, Conn.

Pachygnatha autumnalis Keys.

Zool. Bot. Gesellsch., Wien, 1883.

PLATE XXXIV, FIGURE 22. PLATE XL, FIGURE 9.

This is smaller than the other species, measuring about 4^{mm} in length. The markings are similar but the colors are brighter. The cephalothorax is narrower than in *brevis* and the front part of the head including the upper middle eyes is abruptly raised in both sexes. The three dark stripes on the cephalothorax are united together toward the head which is nearly black especially in the males. The folium is dark brown on the edges and has a light stripe in the middle which is yellow along the edges and sometimes bright red in the middle. The upper middle eyes are much larger than the others and on the sides of a hump in both sexes. The legs are stout and stiff and brownish yellow in color, the front pair the darkest.

Beverly, Cambridge and Lexington, Mass., and New Haven, Conn. Keyserling's specimen came from Pennsylvania.

EXPLANATION OF THE PLATES.

PLATE XXXIII.

1. *Epeira insularis*, dorsal markings of female $\times 2$.
2. *Epeira marmorea*, dorsal markings of female $\times 2$.
- 3, 3a, 3b, 3c. *Epeira patagiata*, dorsal markings of female $\times 2$.
4. *Epeira scolopetaria*, dorsal markings of female $\times 2$.
5. *Epeira stric*, dorsal markings of female $\times 2$.
- 6, 6a. *Epeira nordmanni*, dorsal markings of female; 6b, ventral markings $\times 2$.
7. *Epeira insularis*, male $\times 2$.
8. *Epeira trifolium*, female $\times 2$; 8a, abdomen of light colored female with indistinct markings $\times 2$; 8b, male $\times 2$.
9. *Epeira thaddeus*.
10. *Epeira cinerea*, dorsal markings of female $\times 2$.
11. *Epeira solitaria*, male $\times 2$.
12. *Epeira angulata*, female $\times 2$; 12a, male $\times 2$.
13. *Epeira silvatica*, male $\times 2$; 13a, abdomen of female $\times 2$.
14. *Epeira corticaria*, female $\times 4$.
15. *Epeira pratensis*, abdomen of female $\times 4$; 15a, male $\times 4$.
- 16, 16a. *Epeira trivittata*, dorsal markings of female $\times 4$.
17. *Epeira domiciliorum*, dorsal markings of female $\times 4$.

PLATE XXXIV.

- 1 and 1a. *Epeira gibberosa*, markings of female $\times 8$.
2. *Epeira placida*, markings of female $\times 8$.
- 3 and 3a. *Cyclosa conica* $\times 4$.
4. *Epeira displicata*, dorsal markings of abdomen $\times 4$.
5. *Epeira albiventris*, dorsal markings $\times 4$.
6. *Epeira juniperi*, dorsal markings $\times 4$.
7. *Microepeira radiosa* $\times 16$.
8. *Epeira labyrinthea* $\times 4$.
9. *Epeira triaranea*, dorsal markings $\times 4$.
10. *Epeira foliata* $\times 4$.
- 11 and 11a. *Cyrtarachne bisuccata* $\times 4$.
- 12, 12a, 12b, 12c. *Epeira parvula*, dorsal markings.
13. *Zilla X-notata*, dorsal markings $\times 4$.
14. *Zilla montana*, dorsal markings $\times 4$.
15. *Singa pratensis*, female; 15a, male $\times 4$.
- 16, 16a, 16b. *Singa variabilis*, female $\times 4$; 16c, male $\times 4$.
17. *Epeira stellata*, female $\times 4$.

- 18 and 18a. *Meta menardi*, female $\times 4$.
 19. *Argiope riparia*, female, natural size, dorsal markings.
 20 and 20a. *Argiope transversa*, female, natural size.
 21. *Pachygnatha brevis*, male $\times 8$.
 22. *Pachygnatha autumnalis*, male $\times 8$.

PLATE XXXV.

1. Male palpus of *Epeira silvatica*.
 2. Male palpus of *Epeira angulata*.
 3. Male palpus of *Epeira solitaria*.
 4. 1st and 2d coxæ of *Epeira silvatica*.
 5 and 6. Epigynum of *Epeira silvatica*.
 7 and 8. Epigynum of *Epeira cinerea*.
 9. Epigynum of *Epeira corticaria*.
 10. Male palpus of *Epeira scolopetaria*.
 11. Male palpus of *Epeira patagiata*.
 12. Male palpus of *Epeira strix*.
 13 and 14. Male palpus of *Epeira trifolium*.
 15 and 16. Male palpus of *Epeira quadrata*; same scale as 13.
 17. Male palpus of *Epeira marmorea*.
 18. Male palpus of *Epeira insularis*; same scale as 17.
 19 and 20. Epigynum of *Epeira quadrata*.
 21 and 22. Epigynum of *Epeira trifolium*.

PLATE XXXVI.

1. Second tibia of *Epeira domiciliorum*.
 2. Second tibia of *Epeira trivittata*.
 3. Male palpus of *Epeira trivittata*.
 4. Male palpus of *Epeira domiciliorum*.
 5. End of palpal organ of *Epeira trivittata*.
 6. Palpal organ of *Epeira triaranea*.
 7. Epigynum of *Epeira triaranea*.
 8. Epigynum of *Epeira trivittata*.
 9. Male palpus of *Epeira pratensis*.
 10. Male palpus of *Epeira placida*.
 11. Male palpus of *Epeira labyrinthea*.
 12. Epigynum of *Epeira alboventris*.
 13. Epigynum of *Epeira placida*.
 14 and 15. Male palpus of *Epeira juniperi*.
 16. Epigynum of *Epeira juniperi*.
 17. Male palpus of *Epeira gibberosa*.
 18 and 19. Male palpus of *Epeira carbonaria*.
 20. Male palpus of *Epeira displicata*.

PLATE XXXVII.

1. Male palpus of *Epeira parvula*.
2. Epigynum of *Epeira parvula*.
- 3 and 4. Male palpus of *Epeira stellata*.
5. Epigynum of *Epeira stellata*.
6. Eyes of *Epeira foliata*.
- 7 and 8. Male palpi of *Epeira foliata*.
9. Epigynum of *Epeira foliata*.
10. Second tibia of male *Epeira foliata*.
11. Side of *Epeira infumata*.
12. Abdomen of *Epeira infumata*.
- 12a and 12b. Epigynum of *Epeira infumata*.
13. Eyes of *Epeira infumata*.
- 14 and 15. Tibia of male palpus of *Singa pratensis*.
16. Epigynum of *Singa pratensis*.
17. Male palpus of *Singa pratensis*.
18. Epigynum of *Singa maculata*.
19. Epigynum of *Singa variabilis*.
- 20 and 21. Male palpus of *Singa variabilis*.
- 22 and 23. Male palpus of *Zilla montana*.
- 24 and 25. Male palpus of *Zilla X-notata*.
26. Eyes of *Zilla montana*.
27. Epigynum of *Zilla X-notata*.
28. Epigynum of *Zilla montana*.
29. *Argyropeira hortorum*, male.
30. *Argyropeira hortorum*, female.
31. Male palpi of *Argyropeira hortorum*.
32. Epigynum of *Argyropeira hortorum*.
33. Male palpus of *Metu menardi*.

PLATE XXXVIII.

1. *Micræpeira radiosa*, male.
2. *Micræpeira radiosa*, female.
- 3 and 4. Epigynum of *Micræpeira radiosa*.
5. *Acrosoma spinea*, female.
6. *Acrosoma spinea*, male.
7. *Acrosoma spinea*, young female.
8. *Acrosoma spinea*, male palpus.
9. *Acrosoma mitrata*.
10. *Acrosoma rugosa*.
11. Male palpus of *Cyclosa conica*.
12. Cocoon of *Cyrtarachne bisaccata*.
13. *Argiope riparia*, male.
14. *Argiope riparia*, male palpus, upper and under sides.
15. *Argiope transversa*, male.

- 16 and 17. *Argiope transversa*, male palpus.
18. *Argiope transversa*, epigynum.
19. Epigynum of *Argiope riparia*.

PLATE XXXIX.

1. *Tetragnatha grallator*, mandible of female, under side.
2. *Tetragnatha grallator*, mandible of male, under side.
3. *Tetragnatha grallator*, mandible of small male.
4. *Tetragnatha grallator*, mandible and eyes of male, upper side.
5. *Tetragnatha grallator*, maxillæ of male.
6. *Tetragnatha grallator*, maxillæ of female.
7. *Tetragnatha laboriosa*, eyes of female, from above.
8. *Tetragnatha laboriosa*, mandibles and eyes of male.
9. *Tetragnatha extensa*, mandibles and eyes of male.
10. *Tetragnatha extensa*, mandibles of female.
11. Male palpus of *Tetragnatha laboriosa*.
12. *Tetragnatha vermiformis*, male mandibles.
13. *Tetragnatha vermiformis*, male palpus.
14. *Tetragnatha vermiformis*, female mandibles.
15. *Tetragnatha straminea*, male mandibles and eyes.
16. *Tetragnatha caudata*.
17. *Tetragnatha straminea*, mandibles of female.
18. *Tetragnatha straminea*, eyes from above.
19. *Tetragnatha laboriosa*, female mandibles.
20. *Tetragnatha straminea*, male palpus.
21. *Tetragnatha straminea*, abdomen.
22. *Tetragnatha caudata*.

PLATE XL.

1. Part of web of *Epeira sclopetaria*.
2. Part of web of *Zilla X-notata*.
3. *Epeira sclopetaria*, foot of first or second pair, showing two teeth on the front or inner claw longer than the others.
4. *Epeira sclopetaria*, foot of third pair, showing two longer teeth on inner hind claw.
5. *Epeira sclopetaria*, foot of fourth pair, showing two long teeth on hind or inner claw.
6. Maxillæ of *Epeira insularis*.
7. Internal epigynum of *Tetragnatha laboriosa*.
8. Internal epigynum of *Pachygnatha tristriata*.
9. Male palpi of *Pachygnatha autumnalis*.
10. Male palpi of *Pachygnatha brevis*.

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